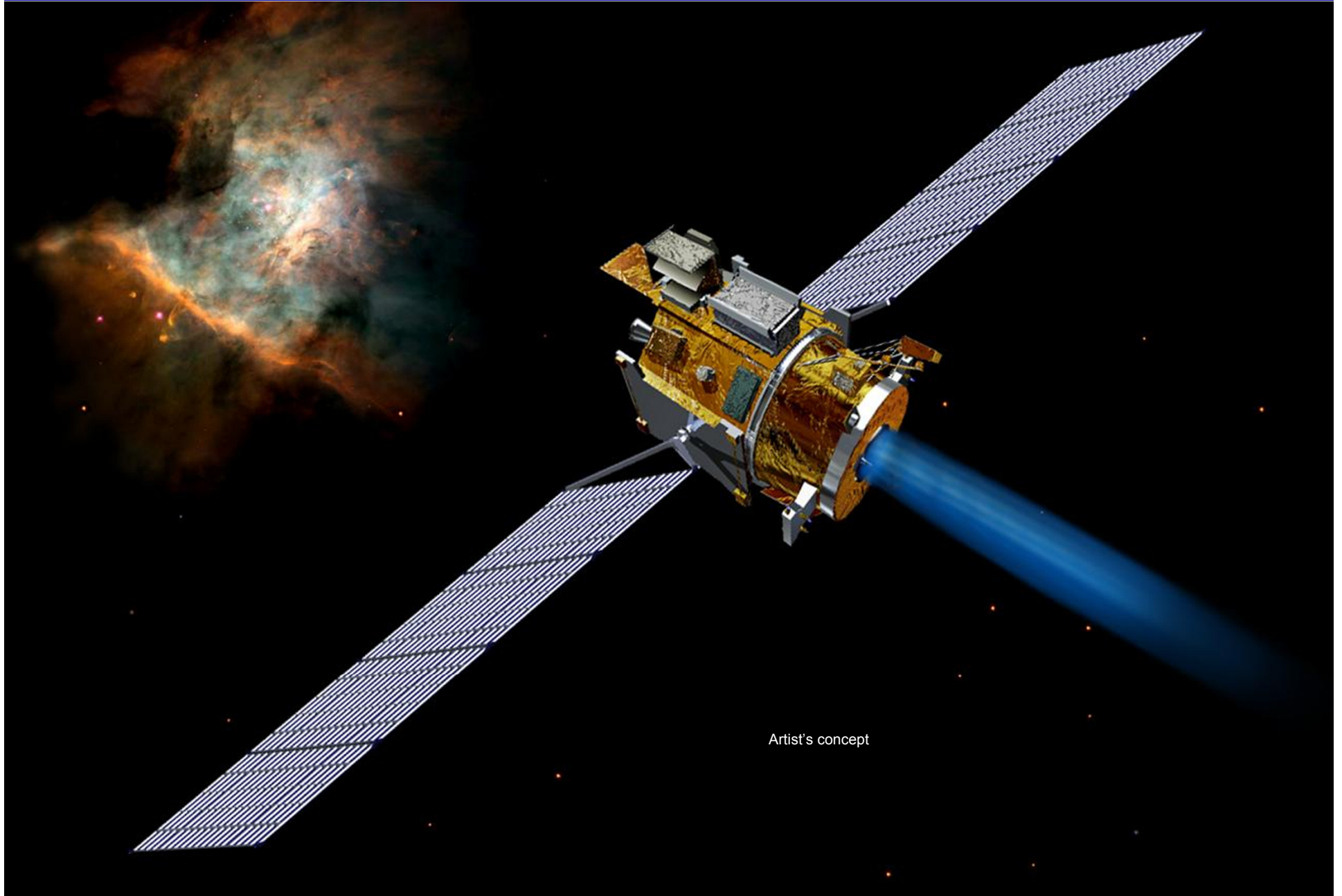# Aerospace Autonomous Systems

Mitch Ingham
Jet Propulsion Laboratory
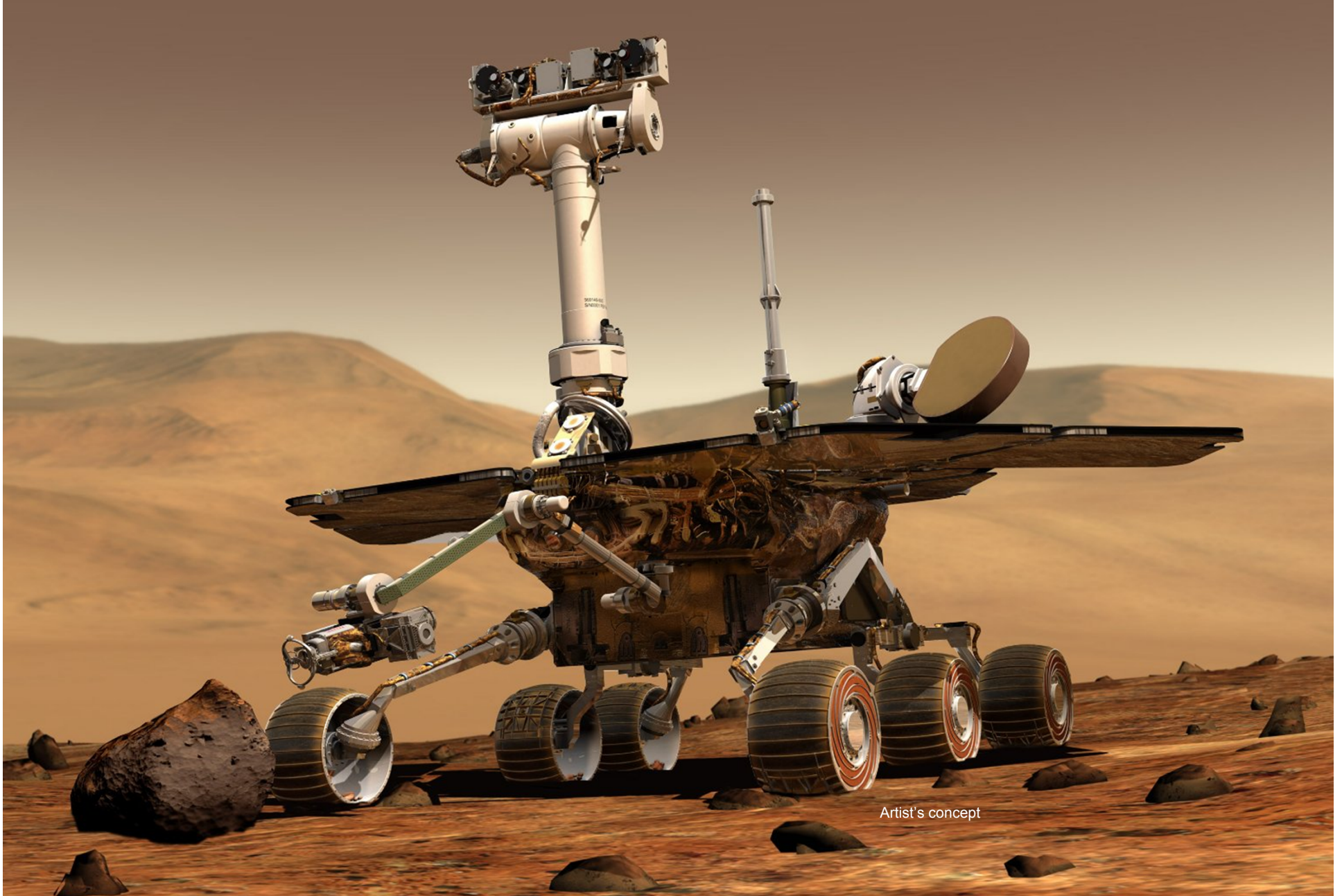
Jack W. Langelaan
Aerospace Engineering, The Pennsylvania State University
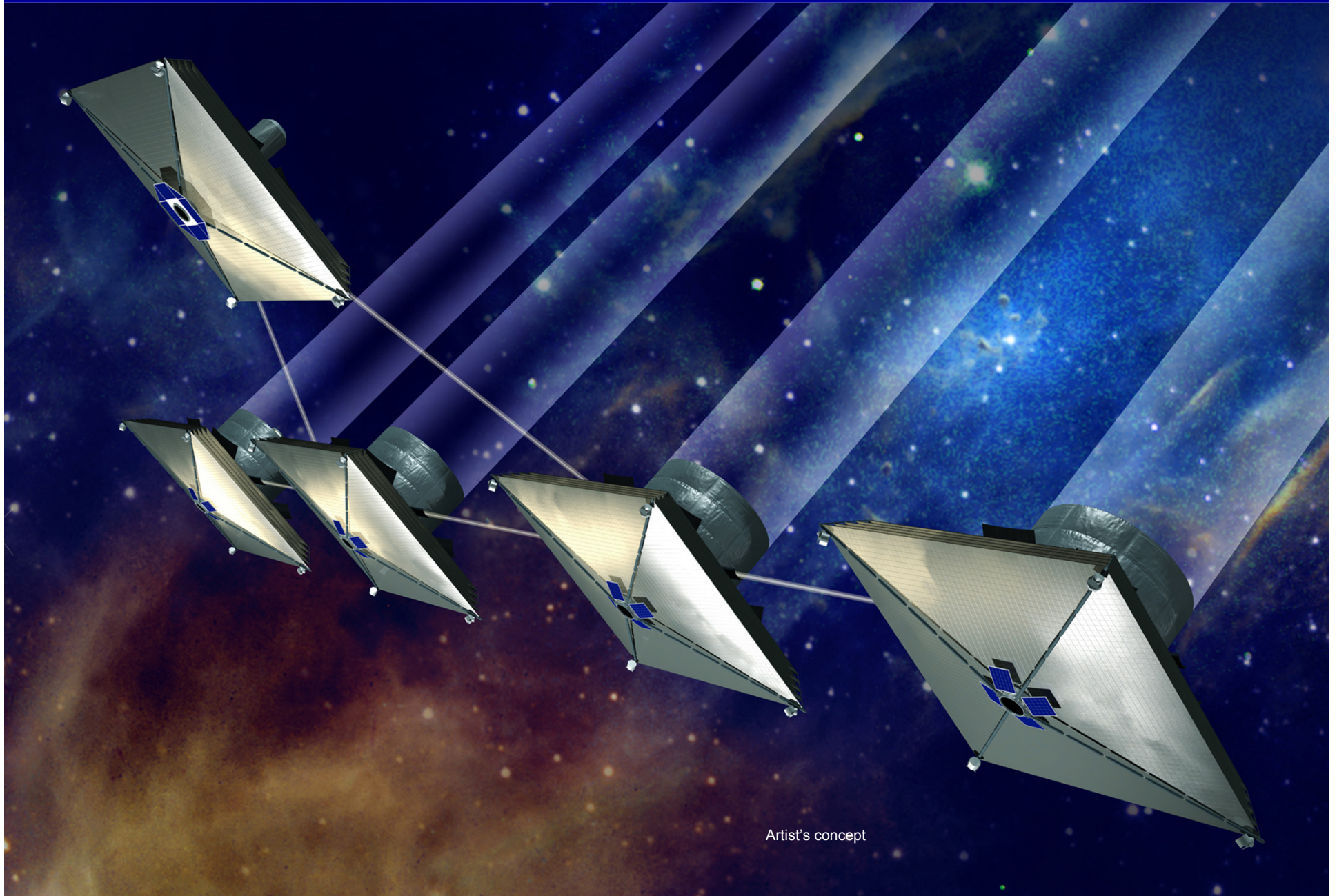
PENNSTATE
1855

JPL
Jet Propulsion Laboratory
California Institute of Technology

Deep Space 1

Artist's concept

Mars Exploration Rover

Artist's concept

Terrestrial Planet Finder

Artist's concept

Human/robot interaction
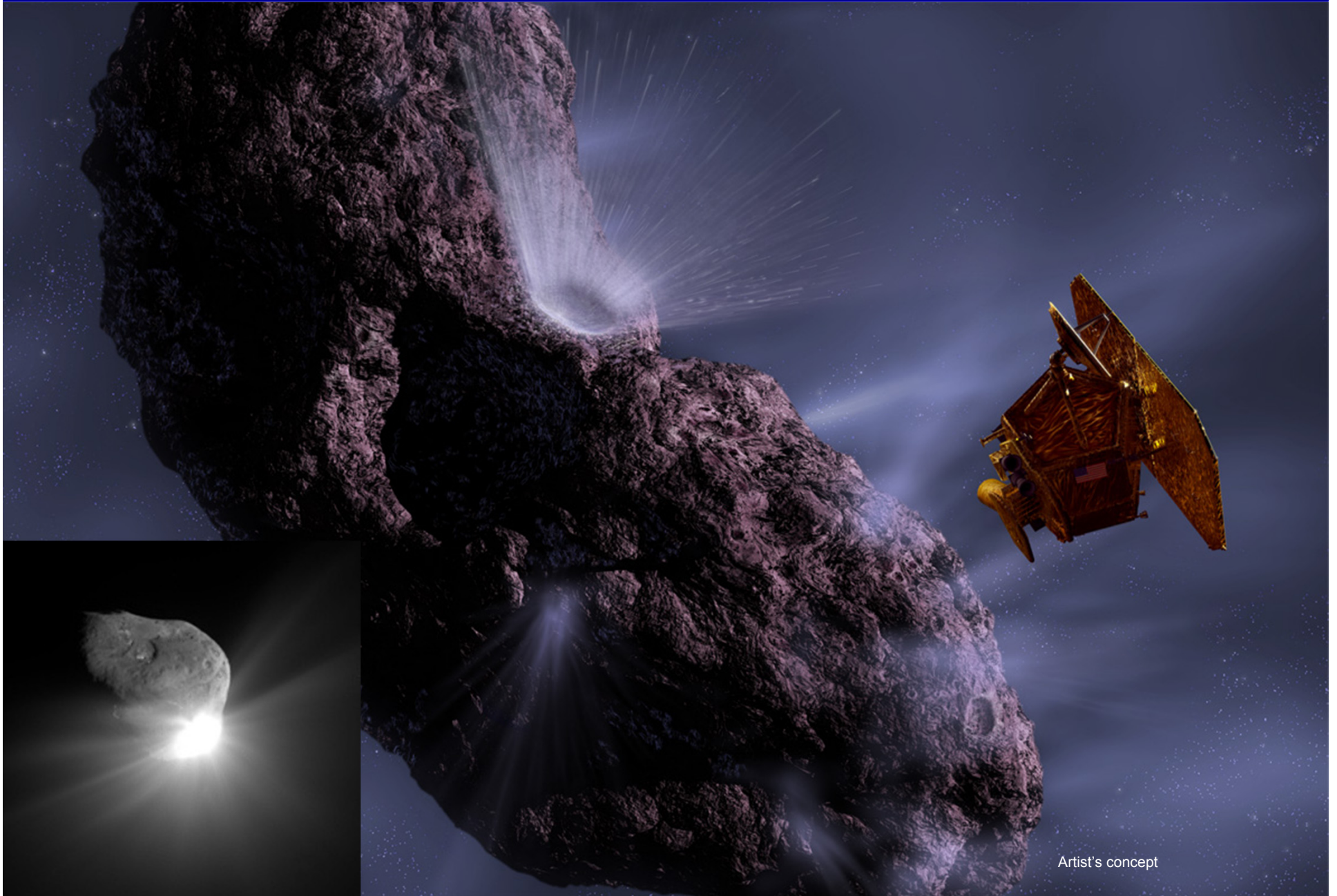

Artist's concept

5

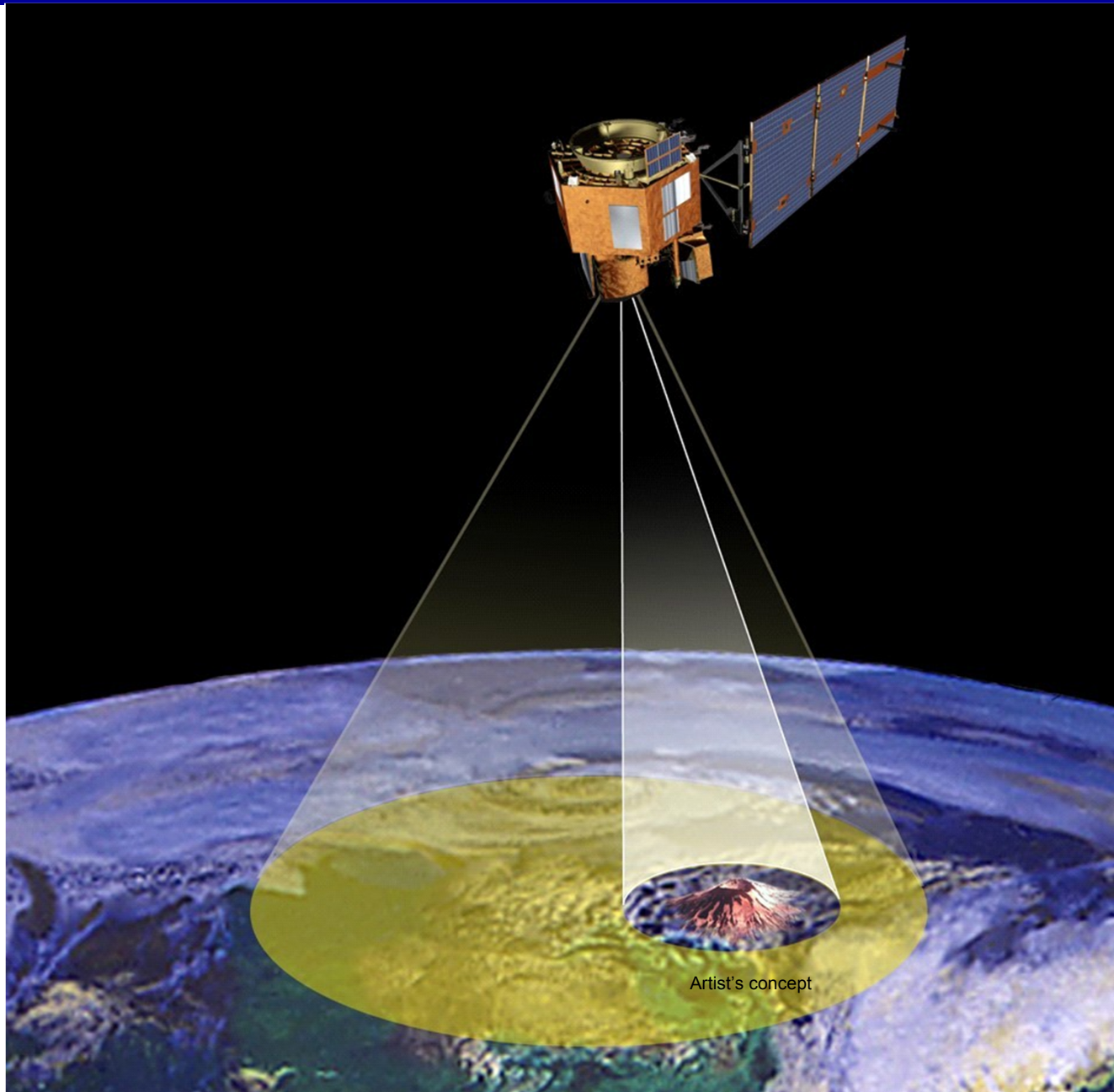# Mars sample return

Artist's concept

Deep Impact

Artist's concept

Earth Observing 1

Artist's concept
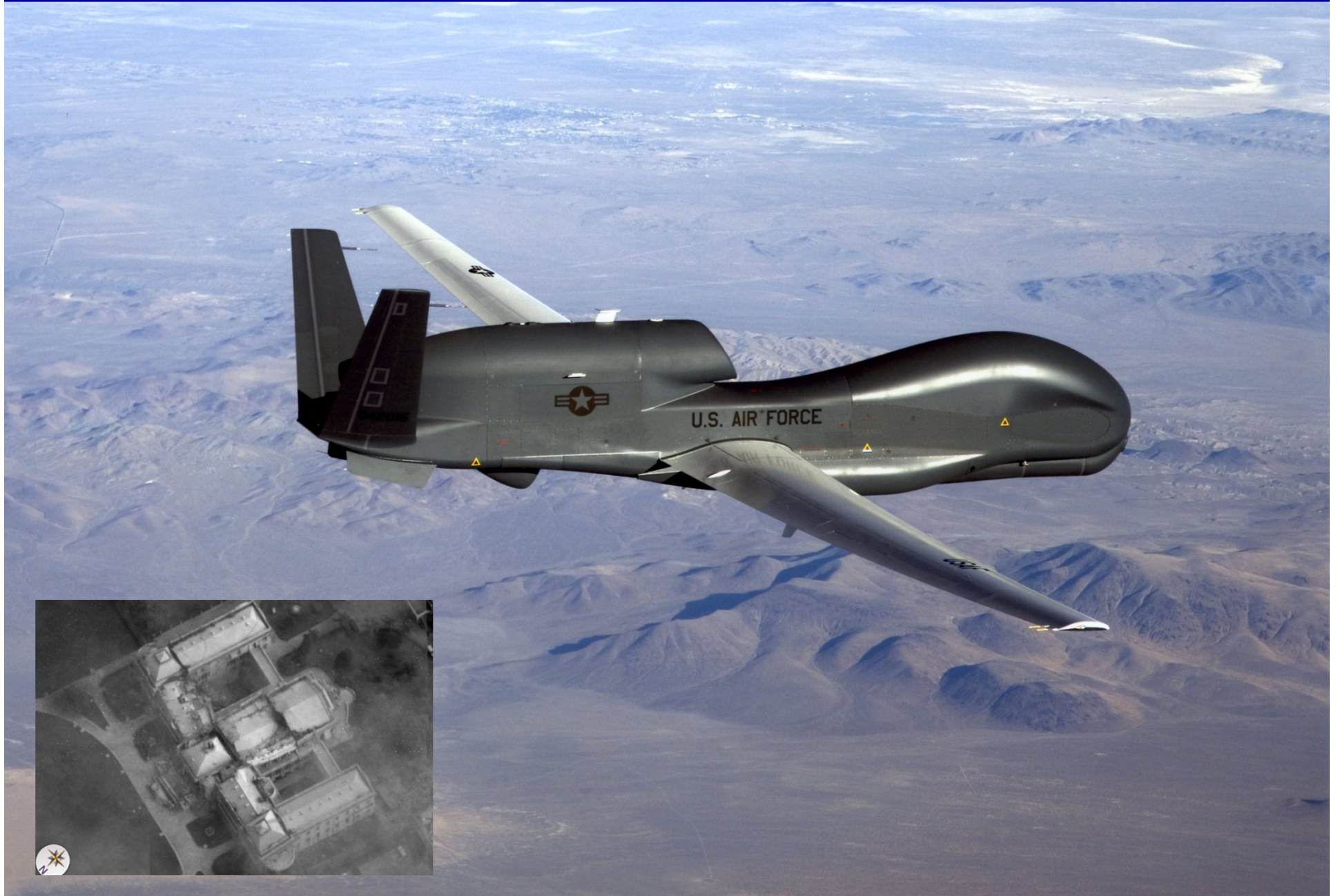
Aerosonde

Global Hawk
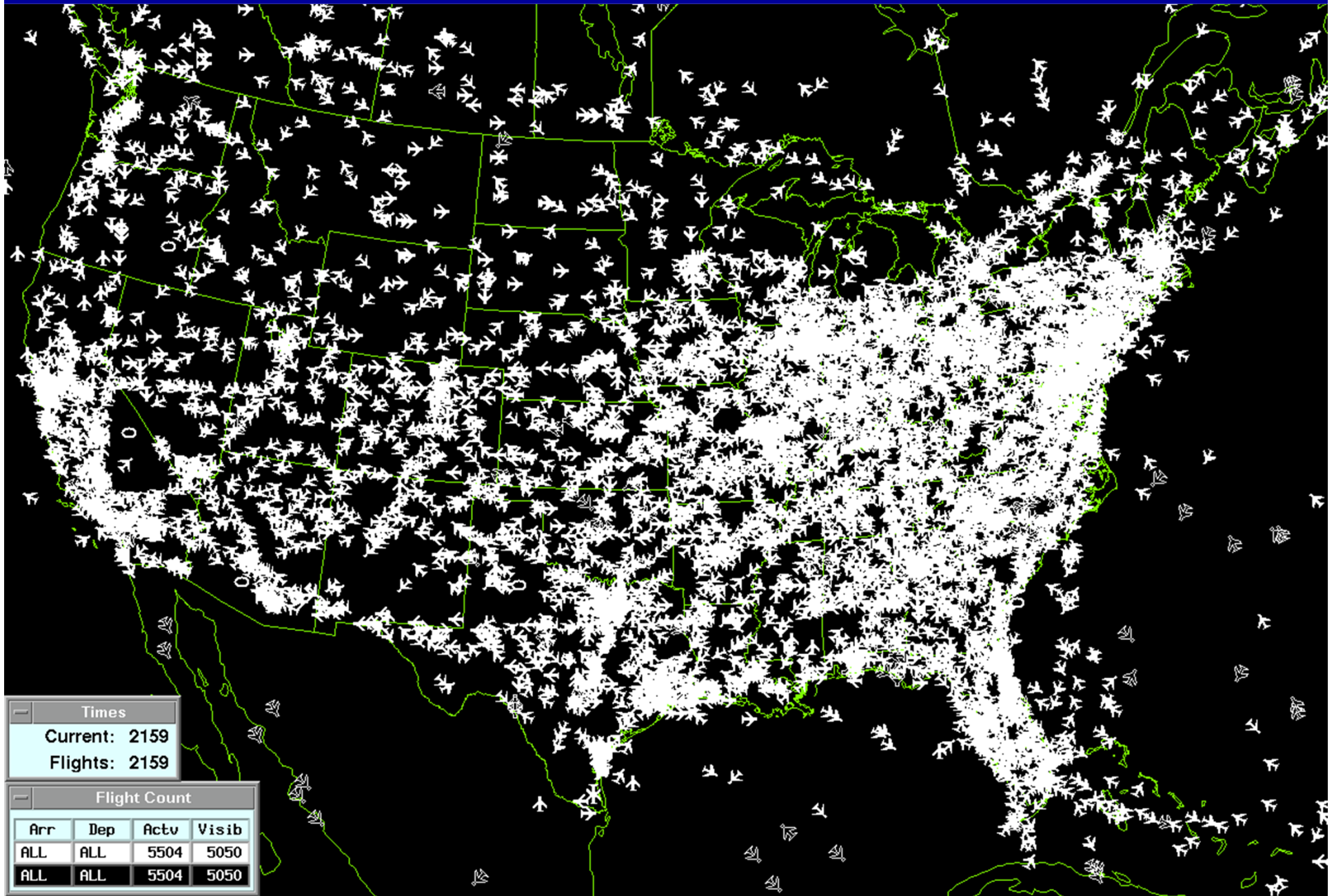
Global Observer

unmanned combat air vehicle

Vulture

Artist's concept

National Airspace

Challenges and Opportunities

Challenges

- *Closing the gap in technological readiness*
- *Reliability*
- *New tools and training needed*
- *cultural hurdle: perceived risk*

Opportunities

- *Enabler for certain missions*
- *Operational cost savings*
- *robustness: increased ability to fly through failure*

The line-up…

Mark Campbell

> *Intelligent Autonomy in Robotic Systems*
>
> *Associate Professor, Mechanical and Aerospace Engineering*
>
> *Cornell University*

Chad Frost

> *Challenges and Opportunities for Autonomous Systems in Space*
>
> *Acting Lead, Autonomous Systems and Robotics Section*
>
> *Intelligent Systems Division, NASA Ames*

Stefan Bieniawski

> *Role of Health Awareness in Systems of Multiple Autonomous Aerospace Vehicles*
>
> *Associate Technical Fellow*
>
> *Boeing Research and Technology*

Ella Atkins

> *Certifiable Autonomous Flight Management for Unmanned Aircraft Systems*
>
> *Associate Professor, Aerospace Engineering*
>
> *University of Michigan*